Rombough, Kyrik

From: Colin Campbell [campbell@rtpenv.com]

Sent: Wednesday, August 27, 2008 1:27 PM

To: Rombough, Kyrik

Subject: Hyperion air permit application - supplemental information

Mr. Rombough,

This email message presents additional information supplementing our PSD permit application submitted on December 20, 2007. This supplemental information is being provided as a follow-up to our discussion regarding the BACT analysis for VOC emissions from storage tanks during our meeting in Pierre on July 14-15, 2008. Specifically, we are proposing a revised air pollution control configuration for six gasoline storage tanks, and we are providing supplemental information supporting our proposed BACT determinations for several other tanks.

As you know, in Section 4.7.1 of our permit application, we proposed to use an internal floating roof design as BACT for 95 organic liquid storage tanks and to use a fixed roof, with no additional air pollution controls, as BACT for the VOC emissions from the remaining 9 organic liquid storage tanks. In Section 4.7.1.5.2 of the permit application, we evaluated a control option that would involve using a thermal oxidizer to control VOC emissions from all 104 of these tanks (i.e., 95 tanks would be controlled using both an internal floating roof and a closed vent system routed to a thermal oxidizer, and 9 would be controlled using only a closed vent system routed to a thermal oxidizer.) We explained that this control option would result in adverse energy and environmental impacts, due to the auxiliary fuel needs for the thermal oxidizer and electrical power needed to induce the flow of tank exhaust gases through the thermal oxidizer without exerting excessive pressure on the storage tanks, and would also result in significant, adverse economic impacts. We proposed that this option be rejected as BACT for these reasons.

Six of the storage tanks that were proposed to be configured as internal floating roof storage tanks are the gasoline product day tanks located at the product loading racks (Tank ID numbers SS14-1 through SS19-1). For these six tanks, we have further evaluated VOC control options, and have concluded that emissions can be controlled to a greater degree using the vacuum-regenerated, carbon adsorption-based vapor recovery system that was previously proposed as BACT for VOC emissions from the product loading racks. This control option is technically feasible for the small day tanks because these tanks will be a part of the vapor balancing system used to control emissions from the product loading operation. The reduction in VOC emissions from storage tank withdrawal and standing losses will be comparable to what is achievable with the thermal oxidizer, as the total VOC emissions from the vapor recovery system will remain within the previously proposed BACT limit of 1.25 pounds per million gallons of product loaded, and there will be no combustion-related emissions.

As you suggested during our meeting in Pierre, for the remaining 89 tanks that are proposed to be equipped with an internal floating roof design, we have further evaluated the thermal oxidizer control option and we have again concluded that this option does not represent BACT. You mentioned that one of DENR's considerations in making its BACT determination is the fact that another facility, the Arizona Clean Fuels Yuma refinery, is required by its PSD permit to employ the control option being considered here. As I mentioned in our meeting, the permit for the Arizona facility expired in March 2008 because the project proponent was unable to commence construction within the required 18-month time period. Therefore, there is absolutely no precedent for the control option under consideration here. In fact, as mentioned in our permit application, U.S. EPA has never even identified and considered this control option in establishing Maximum Achievable Control Technology standards for storage vessels, and those standards are required by the Clean Air Act to represent the maximum degree of emission reductions achievable by a particular category of source. Notably, we are unaware of any organic liquid storage tank, even in the Houston/Galveston and Los Angeles ozone nonattainment areas, equipped with the VOC emission controls being considered here. For these qualitative reasons, as well as the quantitative reasons discussed below, we consider it inappropriate to require the use of a thermal oxidizer for the storage tanks at the HEC.

In Section 4.7.1.5.2 and in Appendix D to the permit application, for the control option that would include a closed vent system routed to a thermal oxidizer, we estimated that the capital cost of this control option as applied to all 104 tanks would be approximately $32 million and the annualized cost would be $3.7 million. The achievable VOC emission reduction was estimated to be 231 tons per year, including 90.7 tons per year from controlling the emissions from the vacuum residuum storage tanks. Based on these values, the cost effectiveness of this control option was estimated to be $16,000 per ton of VOC emission reduction. These cost estimates were based on the use of a single, central thermal oxidizer system serving all of the affected tanks.

In further evaluating the feasibility of the thermal oxidizer control option for the 89 storage tanks proposed to be configured with an internal floating roof design, we have determined that the more practical and cost-effective means of applying this control option would involve installation of two separate thermal oxidizers, one serving the crude and intermediate tanks to the west of the main process area and one serving the product tanks to the south of the main process area. This configuration would greatly reduce the lengths of piping runs between affected tanks and the associated thermal oxidizer system. We estimate that the capital cost of this control option is $24.7 million and the annualized cost is $2.8 million. The achievable emission reduction is 98.1 tons per year and the cost effectiveness is $29,000 per ton of VOC emission reduction.

Recognizing that it is not economically feasible to control VOC emissions from all 89 of the remaining internal floating roof tanks using thermal oxidizers, as discussed above, we have also evaluated whether it would be economically feasible to apply this control option only for the 59 of these tanks that are most economically controlled. (This includes 57 of the 58 tanks that store organic liquids with vapor pressures in excess of 0.01 psia, plus the rich amine tank and the amine swing tank. The methanol tank is excluded due to its geographic separation from the remaining tanks.) As above, our cost estimates for this control option are based on the use of two thermal oxidizers serving tanks in two distinct areas. Our estimate for these tanks is a capital cost of $18.5 million and an annualized cost of $2.1 million. The achievable emission reduction is 92.0 tons per year and the cost effectiveness is $23,000 per ton of VOC emission reduction.

Finally, as you mentioned during our meeting, our estimates of emissions from internal floating roof storage tanks, and as a result our estimates of the emission reductions achievable with a thermal oxidizer and the cost effectiveness of achieving those reductions, are based on the assumption that each affected tank will store a particular material with an assumed maximum vapor pressure. Notwithstanding the need for operational flexibility in the refinery's storage tanks, we consider these assumptions to be appropriate. The economic impacts analysis is being performed not for individual tanks, on which basis the controls would certainly be economically prohibitive, but for collections of several storage tanks. The assumptions regarding stored liquids, vapor pressures, and product mix are fairly characterized as "standard industry practice." In other words, these assumptions represent the inherent design of the refinery, which will produce diesel fuel and jet fuel as well as gasoline; it would be unrealistic to assume that all tanks at the refinery would store gasoline or gasoline blending components, and it would be equally unrealistic to assume that diesel and jet fuel would have a vapor pressure in excess of 0.01 psia. It is normal and customary to assume these types of "standard industry practice" parameters in making BACT determinations, even where those assumptions are not enforceable with respect to a particular emissions unit. See, for example, Section IV.D.2.b of the October 1990 draft NSR Workshop Manual.

Thank you for your attention to this matter.

Colin Campbell

Hyperion Energy Center
Economic Impacts for BACT
Tank Farm Thermal Oxidizer

PARAMETER			CASE 1		CASE 2
Flow Rate	ACFM		9400		6500
VOC IN	tpy		100.1		93.9
REDUCTION	%		98.0		98.0
NG IN	MMBtu/yr		12,135		8,391
VOC OUT	tpy		2.0		1.9
VOC Delta	tpy		98.1		92.0
Capital COST	$		$ 24,740,000		$ 18,471,000
A Capital COST	$/Y		$ 2,716,319		$ 2,028,017
NG COST	$/Y		$ 121,349		$ 83,912
TOTAL A COST	$/Y		$ 2,837,668		$ 2,111,928
NG	$/HR		13.85		9.58
TOTAL A COST	$/HR		323.93		241.09
Cost Effectiveness	VOC		$ 28,927		$ 22,962

Annual interest rate (fraction):	0.07
Control system life (years):	15
Capital recovery factor (system):	0.1098
Operating hours/yr:	8760